A Review of the Water Quality in Beaver Lake Watershed



What is the 303(d) list?

- List of waters currently <u>not</u>
 - Supporting a designated use or
 - Attaining water quality standards or criteria

 ADEQ must compile a 303(d) list every 2 years and submit the list to EPA for approval

Designated Uses and Water Quality Standards

Section 303(c) of the Clean Water Act:

- Requires states to adopt water uses (Designated Uses) consistent with the Clean Water Act
 - Designated uses are those uses specified in water quality standards for each waterbody whether or not they are being attained
 - Existing uses are those uses actually attained in a waterbody on or after November 28, 1975, whether or not they are included in the water quality standards
- Requires states to establish water quality standards to protect the designated uses of each waterbody

Designated Uses

- Extraordinary Resource Waters (ERW)
- Ecologically Sensitive Waterways (ESW)
- Natural and Scenic Waterways
- Fisheries (Aquatic Life)

- Primary Contact Recreation (swimming)
- Secondary Contact Recreation (wading)
- Drinking Water
- Agriculture and Industrial Water Supply

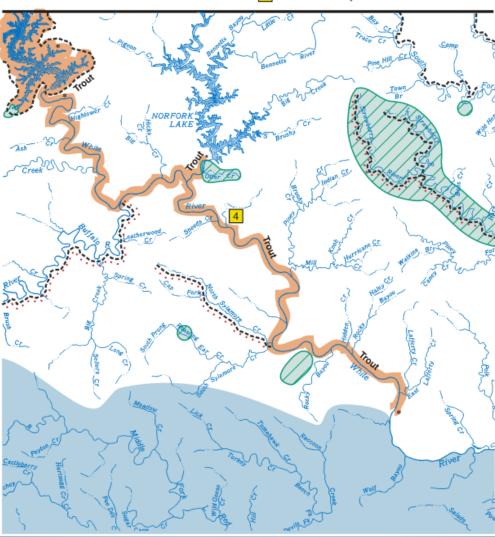
Plate OH-3 (Ozark Highlands)



LEGEND



- Ecologically Sensitive Waterbodies
- Frout - Trout Waters
 - Extraordinary Resource Waters
- · · · · · · Natural and Scenic Waterways
 - Variation by UAA



DESIGNATED USES: OZARK HIGHLANDS ECOREGION

(Plates OH-1, OH-2, OH-3, OH-4)

Extraordinary Resource Waters

Current River (OH-4)

Eleven Point River (OH-4)

Strawberry River (OH-3, OH-4)

Spring River, including its tributaries: Field Creek, Big Creek, English Creek, Gut Creek and Myatt Creek (OH-4)

South Fork Spring River (OH-3, OH-4)

North Sylamore Creek (OH-3)

Buffalo River (OH-2, OH-3)

Kings River (OH-2)

Bull Shoals Reservoir (OH-2, OH-3)

Natural and Scenic Waterways

Strawberry River from headwaters to Sharp-Izard County Line (OH-3, OH-4)

Kings River - that segment in Madison County (OH-2)

Buffalo River (OH-2, OH-3)

North Sylamore Creek (OH-3)*

Ecologically Sensitive Waterbodies

Numerous springs and spring-fed tributaries which support southern cavefish, Ozark cavefish, Arkansas darter, least darter, Oklahoma salamander, cave snails, cave crawfish and unique invertebrates (OH-1, OH-2, OH-3)

Strawberry River - location of Strawberry River darter (OH-3, OH-4)

Spring River - snuffbox and pink mucket mussels; Ozark hellbender (OH-4)

Eleven Point River - location of Ozark hellbender (OH-4)

Current River - location of flat floater and pink mucket mussels (OH-4)

Illinois River - Neosho mucket (OH-1)

<u>Primary Contact Recreation</u> - all streams with watersheds of greater than 10 mi² and all lakes/reservoirs

Secondary Contact Recreation - all waters

Domestic, Industrial and Agricultural Water Supply - all waters

Fisheries

Trout

Bull Shoals Reservoir - lower portion (OH-2)

White River from Bull Shoals Dam to Dam #3 (OH-3)

North Fork White River (OH-3)

Spring River from Mammoth Springs to South Fork Spring River (OH-4)

Upper White River from Beaver Dam to State Line (OH-1)

Lakes and Reservoirs - all

Streams

Seasonal Ozark Highlands fishery - all streams with watersheds of less than 10 mi² except as otherwise provided in Reg. 2.505

Perennial Ozark Highlands fishery - all streams with watersheds of 10 mi² and larger and those waters where discharges equal or exceed 1 CFS

As designated in the National Wild and Scenic Rivers System

Use Variations Supported by UAA or Other Investigations

Railroad Hollow Creek - no fishable/swimmable uses (OH-1, #1)

Columbia Hollow Creek - seasonal fishery March-June (OH-1, #2)

Curia Creek - below first waterfall, perennial fishery (OH-4, #3)

Moccasin Creek - below Highway 177, perennial fishery (OH-3, #4)

Stennitt Creek- from Brushy Creek to Spring River, no domestic water supply use (OH-4)

SPECIFIC STANDARDS: OZARK HIGHLANDS ECOREGION

(Plates OH-1, OH-2, OH-3, OH-4)

	Stream	<u>s</u>	Lakes and Reservoirs
Temperature °C (°F)* Trout waters	29 (84.2 20 (68)	2)	32 (89.6)
Turbidity (NTU) (base/all)	10/17		25/45
Minerals	see Reg	. 2.511	see Reg. 2.511
Dissolved Oxygen**	<u>Pri.</u>	Crit	see Reg. 2.505
<10 mi ² watershed 10 to 100 mi ² >100 mi ² watershed Trout waters	6 6 6	2 5 6 6	

All other standards (same as statewide)

Variations Supported by UAA

Railroad Hollow Creek: from headwaters to Spavinaw Creek - year-round dissolved oxygen - 2 mg/l (OH-1, #1) Curia Creek - below first waterfall, critical season D.O. 6 mg/l (OH-4, #3)

Moccasin Creek - below Highway 177, critical season D.O. 5mg/l (OH-3, #4)

SWEPCO Reservoir - maximum temperature 54°C (limitation of 2.8°C above natural temperature does not apply) (OH-1, #5)

Stennitt Creek - from Brushy Creek to Spring River, TDS = 456 mg/l (OH-4, #6)

Water Quality Standards

Numeric Standards

ALL WATERBODIES - HUMAN	N HEALTH CRITERIA
Substance	Criteria (ng/l)*
Dioxin (2,3,7,8 TCDD)	0.001
Chlordane	5.0
PCBs (polychlorinated biphenyls)	0.4



Narrative Standards

Reg. 2.509 Nutrients

Materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities or other nuisance aquatic vegetation or otherwise impair any designated use of the waterbody. Impairment of a waterbody from excess nutrients are dependent

List Development

- Collect data from stream segments, assemble and evaluate all existing and readily available water quality data.
- 2. Assess data based upon Regulation No. 2 and the
- "Assessment Methodology"
 - a. Regulation No. 2 provides the value
 - b. Assessment Methodology provides the procedure
- 4. Make a "Support" or "Non-Support" determination
- 5. Compile 303(d) List
- 6. Public Notice
- 7. Submit to EPA on or before April 1 every other year



Water Quality Monitoring Network

Ambient Surface Water Network

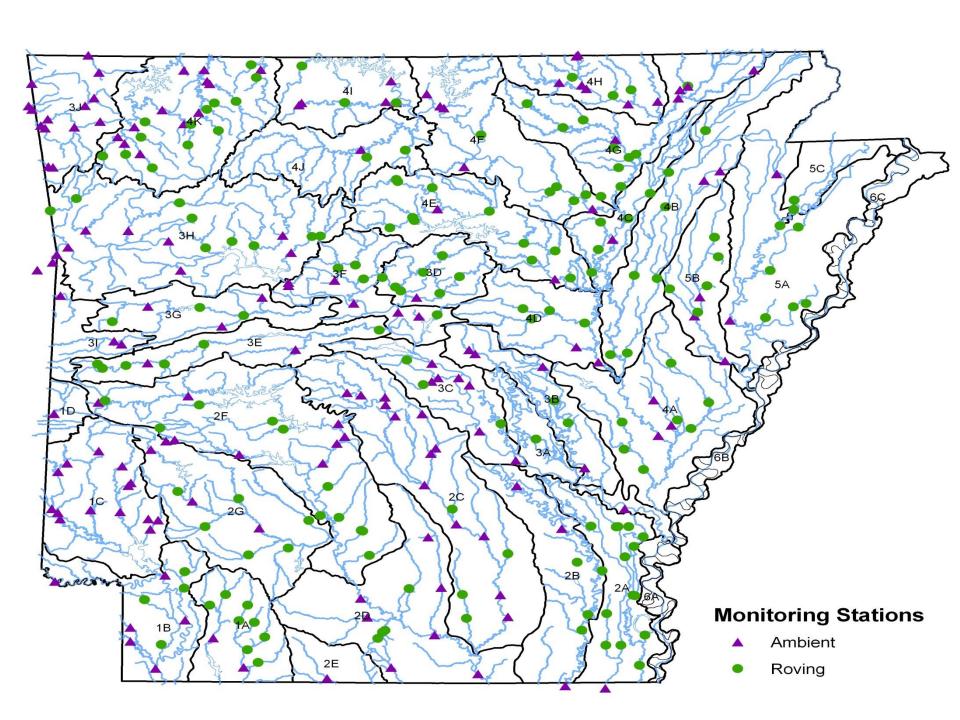
- Approximately 150 stations
- Chemical parameters & flow
- Sampled monthly
- ~25-30 years of data

Roving Surface Water Network

- Approximately 200 stations
- Waters with limited or no WQ data
- Sampled every other month for 2 years, then move on

Special Projects





Watershed Monitoring Network

Macroinvertebrate Community

Watershed Based 20 – 30 sites Statewide 100+ sample/year





Fish Community

Watershed Based 10 – 20 sites Statewide 30+ sample/year

Assessments



Parameter	Support	Non-support
Temperature	<u><</u> 10%	> 10%
DO	< 5 samples or <u><</u> 10%	> 10%
рН	<u><</u> 10%	> 10%
Turbidity	<u>< 25</u> %	> 25%

Example: 60 Temperature measurements were taken at a station representing a particular stream segment during the period of record.

If 6 samples exceed the criteria SUPPORT

If 7 samples exceed the criteria NON-SUPPORT

Assessments



6.9 Nutrients

(B) Site Specific Nutrient Standards

Lake Chlorophyll a (µg/L)**

Secchi Transparency (m)***

Beaver Lake*

8

1.1

*These standards are for measurement at the Hickory Creek site over the old thalweg, below the confluence of War Eagle Creek and the White River in Beaver Lake.

- **Growing season geometric mean (May-October)
- ***Annual Average

Assessments



LISTING METHODOLOGY FOR BEAVER LAKE:

The upper portion of Beaver Lake will be listed as non-support of its drinking water designated use when there are three or more (\geq 3) exceedances of the chlorophyll a criteria within the five-year period of record. Samples collected 1.0 meter below the surface of the water will be used to make lake and reservoir attainment decisions.

The upper portion of Beaver Lake will be listed as non-support of its drinking water designated use when there are three or more (\geq 3) exceedances of the secchi transparency criteria within the five-year period of record.

DELISTING METHODOLOGY FOR BEAVER LAKE:

The upper portion of Beaver Lake will be listed as supporting its drinking water designated use when there are no more than two (2) exceedances of the chlorophyll a criteria and no more than two (2) exceedances of the secchi transparency criteria within the five-year period of record. Samples collected 1.0 meter below the surface of the water will be used to make lake and reservoir attainment decisions for chlorophyll a.

305(b) Report Listing Format

Five Categories of Waters:

- All designated Uses and water quality standards are met
 TMDL has been completed, but now meeting
- 2. Some uses and standards met, insufficient data to assess other uses
- 3. Insufficient data to assess any uses
- 4. Water impaired, does not require a TMDL:
 - 4A: a TMDL has already been completed
 - **4B**: other pollution control requirements will result in WQ standards attainment
 - 4C: impairment is not caused by a pollutant

305(b) Report Listing Format

Five Categories of Waters:

5. Waters not meeting WQ standards (303(d) List)

High

Truly impaired, TMDL needed

Medium

Adoption of new regulations or standards

Questionable data

Data verification needed

Impairment caused by a point source

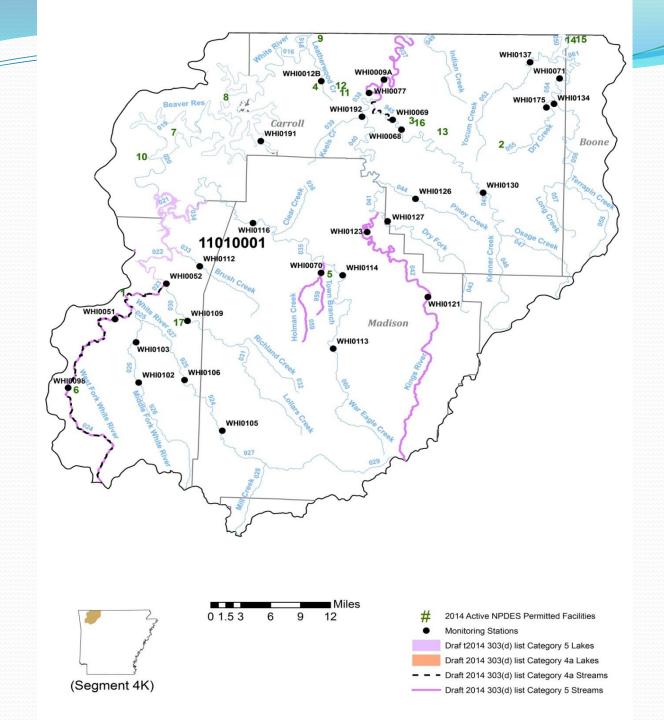
Low

Impairment is naturally occurring ADEQ did not support the listing (EPA added)



So, how's the water quality?





							Des	ig na	ted 1	Use			SOUE	RCE		(CAUS	E		ST	'A TU	S			
STREAM NAME	H.U.C.	RCH	MILES	STATION	ASSESS	FC	FSH				ΑI				4		2 3		1				USE	SUPPOR	NON-SUPPORT
SEG-4K																									
White River	110 10 0 0 1	-022	8.3		U														3				FISHCONSUMPTION	478.1	0
White River	110 10 0 0 1	-023	6.2	WHI0052	M	S	N	S	S	S	S	UN		UN	SE	SO4	T	b Tn	n 5	5	4	a :	FISHERIES	435.6	42.5
West Fork	110 10 0 0 1	-024	27.2	WHI0051+	M	S	N	S	S	S	S	UN	UN	SE		SO4 T	DS T	b Tn	n 5	5 5	5 4	a :	PRIMARY CONTACT	478.1	0
White River	110 10 0 0 1	-025	2.4		U														3				SECONDARY CONTACT	478.1	0
Middle Fork ¹	110 10 0 0 1	-926	13.8	WHI0 10 2	M	S	S	S	S	S	S								1				DRINKING SUPPLY	464.5	13.6
Middle Fork ²	110 10 0 0 1	-026	8.1	WHI0 10 3	M	S	S	S	S	S	S								1				AGRI & INDUSTRY	464.5	13.6
White River ³	110 10 0 0 1	-927	6.6	WHI0 10 5	M	S	S	S	S	S	S								1						
White River ⁴	110 10 0 0 1		17.2	WHI0106+	M	S	S	S	S	S	S								1						
Mill Creek	110 10 0 0 1		6.1		Е	S	S	S	S	S	S								1						
White River	110 10 0 0 1		13.5		Е	S	S	S	S	S	S								1						
Richland Cr.	110 10 0 0 1		12.1	WHI0 10 9	M	S	S	S	S	S	S								1						
Lollar Creek	110 10 0 0 1		12.5		Е	S	S	S	S	S	S								1						
Richland Cr.	110 10 0 0 1		7.1		Е	S	S	S	S	S	S								1						
Brush Creek	110 10 0 0 1		13.5	WHI0 112	M	S	S	S	S	S	S								1	l			1		
War Eagle Cr.	110 10 0 0 1		22.2	WHI0 116	M	S	S	S	S	S	S								1						
War Eagle Cr.	110 10 0 0 1		8.6		E	S	S	S	S	S	S								1						
Leatherwood Creek	110 10 0 0 1		7.6	WHI0012B	M	S	S	S	S	S	S								1						
Clear Creek	110 10 0 0 1		6.7		Е	S	S	S	S	S	S								1						
King s River	110 10 0 0 1		19.1	WHI0009A	M	S	S	S	S	S	S	UN				TDS			5	5					
King s River	110 10 0 0 1	-038	3.4	WHI0077	M	S	S	S	S	S	S								1	l					
King s River	110 10 0 0 1	-040	17.9		E	S	S	S	S	S	S								1	l					
King s River	110 10 0 0 1	-041	4.8	WHI0 12 1	M	S	S	S	S	S	S								1						
King s River	110 10 0 0 1	-042	39.5	WHI0 12 3	M	S	S	S	S	S	S	UN				TDS			5	5					
Keels Creek	110 10 0 0 1	-039	7.3		E	S	S	S	S	S	S								1						
Dry Fork	110 10 0 0 1	-043	16.5	WHI0 127	M	S	S	S	S	S	S								1						
Piney Creek	110 10 0 0 1	-044	10.2	WHI0 12 6	M	S	S	S	S	S	S								1						
Osage Creek ⁵	110 10 0 0 1	-945	25.6	WHI0068+	M	S	S	S	S	S	S	MP				TP			4:	a					
Osage Creek ⁶	110 10 0 0 1	-045	5.0	WHI0069	M	S	S	S	S	S	S								1						
South Fork	110 10 0 0 1		13.8		Е	S	S	S	S	S	S								1						
Osage Creek	110 10 0 0 1		13.4		Е	S	S	S	S	S	S								1						
Yocum Creek	110 10 0 0 1		16.2	WHI0 137	M	S	S	S	S	S	S								1						
Long Creek	110 10 0 0 1		8.4	WHI0071	M	S	S	S	S	S	S								1						
Dry Creek	110 10 0 0 1		12.0		E	S	S	S	S	S	S								1	l					
Long Creek	110 10 0 0 1		14.3	WHI0134+	M	S	S	S	S	S	S								1						
Long Creek	110 10 0 0 1	-057	8.6		E	S	S	S	S	S	S								1						
Terrapin Cr.	110 10 0 0 1		11.2		E	S	S	S	S	S	S								1						
Town Branch	110 10 0 0 1	-959	4.5	UAA	M	S	S	S	S	N	N	MP				TDS			5	5					
Holman Creek	110 10 0 0 1	-059	9.1	WHI0070	M	S	N	S	S	N	N	MP	SE			TDS N	103		5	5 4	a				
War Eagle Cr.	110 10 0 0 1	-060	28.3	WHIO 114	M	S	S	S	S	S	S								1						
TOTALMILES	488.8					-						-			•				•				-		
MILES UNASSESSED	10.7																								
MILES EVALUATED	138.7																								
MILES MONITORED	339.4																								
1 1	Reach forma	ally -026	U																						
2 1	Reach forma	ally -026	L																						
3	Reach forma	ally -027	U																						
4 1	Reach forma	ally -027	L																						
5	Reach forma	ally -045	U																						
6	Reach forma	ally -045	L																						
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Category 5-Streams

STREAM NAME	COUNTY	HUC	RCH	PLNG	MILES	MONITORI NG STATIONS		De	signated Use	Not Suppor	ted						Water	Quality Stand	dard Non-Atta	ainment							Source of C		Approval Date		
							FC	FSH	PC	SC	DW	Al	DO	pH	Tm	Tb	CI	SO4	TDS	PA	Cu	Pb	Zn	Other	IP	MP	SE	AG	UR	Other	
West Fork	Washington	11010001	-024	4K	27.20	WHI0051		х								x				22222							х				1/5/2006
White River	Washington	11010001	-023	4K	6.20	WHI0052		×								х											x				1/5/2006
Osage Creek Near Berryville	Carroll	11010001	-945	4K	5.00	BUFET008; WHI0065; WHI0069; WHI0130																		TP					AAAAA AAAAA AAAAA AAAAA		1/10/2006

Category 4a-Streams

			~ ~ ~ ~ ~ ~ ~		00000	0.000.000	0.000.000				0000000		0.00000	0.000.00		0.000.000			0.000.000									0.000.000	000000		0.000.000
STREAM NAME	COUNTY	HUC	PLNG	MILES	MONITORI NG		De	signated Us	e Not Support	ted						Water	Quality Stand		SOURCE												
NAME	COUNTY	нос	RCH	SEG	IVIILES	STATIONS	FC	FSH	PC	sc	DW	AI	DO	pН	Tm	ТЬ	CI	SO4	TDS	PA	Cu	Pb	Zn	Other	IP	MP	SE	AG	UR	Other	Priority
Kings River	Carroll	11010001	-037	4K	19.1	WHI0009A													x											UN	L
Kings River	Madison	11010001	-042	4K	39.5	WHI0123													x											UN	L
Town Branch	Madison	11010001	-959	4K	4.5	UAA													x												
Holman Creek	Madison	11010001	-059	4K	9.1	WHI0070, UAA													x												
White River	Washington	11010001	-023	4K	6.2	WHI0052, UAA									x			x												UN	н
West Fork	Washington	11010001	-024	4K	27.2	WHI0051, UAA		x							x			x	x											UN	н

Category 5-Lakes

LAKE NAME	HUC	Lake	PLNG	Acres	COUNTY	MONITORI NG		Des	signated Use	Not Support	ed						Water	Quality Stand	lard Non-Atta	ainment							Source of Co	ontamination			Priority
		Type	SEG			STATION	FC	FSH	PC	SC	DW	Al	DO	pН	Tm	Tb	CI	SO4	TDS	PA	Cu	Pb	Zn	Other	IP	MP	SE	AG	UR	UN	
Beaver - Upper	1101001	Α	4K	1500	Benton, Washington	LWHI013B, BWD		×	x							x				x							x				н

De-Listing of Waters

- Develop a TMDL
- Implement control strategies (other than a TMDL)
- Updated assessments indicate no known impairments
- Improved delineation of impaired waterbodies
- Improved water quality standards and assessment methodologies



Status of Current TMDLs

- West Fork White River (turbidity)
 - BWA and AWRC submitted data to ADEQ for 2016 cycle
 - Under review
- Town Branch-Holman Creek (nitrate)
 - No Change



Other Water Quality Activities

- Use Attainability Analyses and Third Party Rulemakings
 - White River (City of Fayetteville)
 - Proposed SSC for Chloride, Sulfate, and TDS
 - Town Branch/Holman Creek/War Eagle Creek (City of Huntsville)
 - Proposed SSC for Chloride, Sulfate, and TDS



Other Water Quality Activities

- Act 335 of 2015
 - Nutrient Trading Advisory Panel
- ADEQ developing nutrient criteria for ERWs



Questions

<u>501-682-0661</u> <u>wentz@adeq.state.ar.us</u>